U. S. Department of Agriculture

Forest Service

APPALACHIAN FOREST EXPERIMENT STATION

Technical Note No. 14
Pathology

Asheville, N. C.
June 3, 1935.

RELATION BETWEEN BUTT ROT AND FIRE IN SOME EASTERN HARDWOODS

By

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U. S. Department of Agriculture.

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The following table is based upon the study of 5,882 trees cut in eight eastern States from New Jersey through Tennessee. Areas were chosen on commercial logging operations and data were taken on all trees cut by the operators on these areas. Logs were scaled by the Scribner Decimal C log rule. The method of scaling and making deductions for defect is explained in Technical Note No. 13 of this Station, "Relation Between Tree Diameter and Percentage of Cull in Some Eastern Hardwoods."

Species	Trees with basal fire wounds 1/				Trees without basal wounds			
	No. of trees	Aver. d.b.h	% Trees with butt rot	Cull % due to butt rot	No. of trees	Aver. d.b.h	% Trees with butt rot	Cull % due to butt rot
Basswood	56	19.7	100	39.3	59	17.4	44	13.1
Yellow Poplar	135	25.2	88	20.7	149	21.9	5	.4
Chestnut Oak	366	19.9	79	18.5	361	14.7	3	1.5
Scarlet Oak	673	14.2	64	16.4	589	13.8	5	.8
Northern Red Oak	403	20.7	72	13.3	406	17.3	8	2.2
Black Oak	411	16.0	58	12.9	478	15.8	2	.4
White Oak	671	18.4	61	11.6	783	16.6	6	1.2
Post Oak	157	17.1	52	5.6	185	17.2	4	.8
All species (weighted)	2872	17.9	67	15.5	3010	16.1	6	1.5

1/ 3% of these trees had wounds recorded as not caused by fire.

This table shows that of the trees recorded as having no basal wounds only 6% showed butt rot at stump height, while of the scarred trees 67% showed butt rot. The cull percent due to butt rot for all of the trees without basal wounds was 1.5 as compared to 15.5 for the trees with basal wounds. 94% of all of the butt rot was in scarred trees.

Of the total volume culled in this study 77% was due to butt rot, 20% was due to top rot, and 3% to miscellaneous defects such as crook and fork. If, as shown in the table above, trees wounded at the base have about ten times as much butt defect as unwounded trees, and if 97% of the basal wounds are caused by fire, then the elimination of fire would mean reducing the total present cull volume from all sources (butt rot, top rot, and other) for these hardwoods to about one-third its present total. This figure is conservative because it is based only on the merchantable trees. Many of the trees left as unmerchantable were in that condition as a result of fire-scarring followed by decay. It is also conservative because some of the butt-rotted trees recorded as having no basal wounds may have had small healed scars which did not extend to stump height, but which nevertheless may have served as starting points for the decay.

The stands studied were mainly of seedling origin, and the conclusions apply only to such areas. In the sprout stands that develop as the result of repeated cutting on short rotation, butt rot more often occurs independently of fire scars.

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APPALACHIAN FOREST EXPERIMENT STATION

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Management - Coastal Plain

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A METHOD OF DETERMINING DENSITY OF LOBLOLLY PINE STANDS

By

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The evaluation of the density of stocking of even-aged stands is of considerable importance in the determination of yield, the prediction of growth, and the comparison of stands. Lacking better means, foresters have computed density as the ratio of either the volume, basal area, or number of trees per acre for a given stand of known age and site to corresponding values in normal yield tables. A new method recently developed[1] allows the evaluation of density of stocking by referencing the number of trees per acre growing in a stand of known average diameter to the number which would be present if the stand were densely stocked.

This technical note presents a table showing the number of trees per acre which occur in densely stocked stands of loblolly pine having different average diameters. The figures presented do not necessarily represent the number of trees which an area should support to give best growth or maximum yield, but instead are presented for use as base values to which other stands may be referenced. It is proposed that values presented in the attached table be considered as representing 100% stocking until further investigations provide

1/ Reineke, L. H. Perfecting a stand-density index for even-aged forests. Jour. Agr. Research, Vol. 46, p. 627-637, 1933.

a sound basis for changing them. These tabular values were derived from a re-analysis of the field data collected by the Southern Forest Experiment Station as representing fully stocked stands for use in the preparation of normal yield and stand tables for loblolly pine[2/].

In using the table to determine the density of a given stand only the average diameter of the stand and the number of trees per acre over 1.0 inches in diameter need be determined. The number of trees which represent 100% stocking for the given average diameter is then read from the table and the density of the stand determined by dividing the actual number of trees by the number necessary for 100% stocking. The following example illustrates the procedure:

Given, a stand: No. of trees per acre = 500
Average D.B.H.o.b. (from average basal area) = 6.4 inches

Number of trees per acre for a 100% Stocked stand with average diameter of 6.4 inches (read from table) = 607

Density of given stand = 500 divided by 607 = 82%

2/ U.S.D.A. Volume, Yield, and Stand Tables for Second-Growth Southern Pines. U.S.D.A. Misc. Pub. 50, September, 1929.

Number of Trees Necessary for 100% Stocking
in Loblolly Pine Stands of Different Average Diameters

1/ Average D.B.H. o.b.	2/ Base No. of trees per acre	1/ Average D.B.H. o.b.	2/ Base No. of trees per acre	1/ Average D.B.H. o.b.	2/ Base No. of trees per acre	1/ Average D.B.H. o.b.	2/ Base No. of trees per acre
1.0	14,420	6.0	677	11.0	240	16.0	127
1.2	10,560	6.2	641	11.2	233	16.2	124
1.4	8,121	6.4	607	11.4	226	16.4	121
1.6	6,466	6.6	575	11.6	220	16.6	119
1.8	5,285	6.8	547	11.8	214	16.8	117
2.0	4,416	7.0	520	12.0	207	17.0	115
2.2	3,753	7.2	496	12.2	201	17.2	113
2.4	3,235	7.4	473	12.4	196	17.4	110
2.6	2,821	7.6	452	12.6	191	17.6	108
2.8	2,488	7.8	433	12.8	186	17.8	106
3.0	2,211	8.0	414	13.0	181	18.0	104
3.2	1,981	8.2	397	13.2	176	18.2	102
3.4	1,788	8.4	381	13.4	172	18.4	100
3.6	1,621	8.6	366	13.6	168	18.6	98
3.8	1,475	8.8	352	13.8	164	18.8	96
4.0	1,353	9.0	339	14.0	160	19.0	94
4.2	1,245	9.2	326	14.2	156	19.2	93
4.4	1,151	9.4	314	14.4	152	19.4	91
4.6	1,064	9.6	303	14.6	148	19.6	90
4.8	990	9.8	293	14.8	145	19.8	89
5.0	924	10.0	283	15.0	142	20.0	87
5.2	864	10.2	274	15.2	139	20.2	86
5.4	812	10.4	265	15.4	136	20.4	84
5.6	762	10.6	256	15.6	133	20.6	83
5.8	718	10.8	248	15.8	130	20.8	82
						21.0	80

1/
. Average D.B.H.o.b. is the diameter breast high outside bark for the tree of average basal area.

2/
. These values were obtained from the regression equation

Logarithm of number of trees per acre = -1.707 logarithm of average D.B.H.o.b. of the stand + 4.1588; for which the correlation coefficient is .9625, and the standard error of estimate is $\pm$.0862 in logarithmic units, or $\pm$17.2%.